There are **Desktop PC** and then there are **Server**

Different Types of Desktop PC and Server components:

- Desktop PC Cpu: the two main manufacturers are Intel and AMD. Eg: intel i3, i5, i7 Amd Fx and Phenom
- Server cpu: Intel Xeon + AMD Opteron
    - The server class cpu have circulatory and cpu support for multi cpu capability

Characteristic difference between Desktop PC and Servers

- **Desktops**: tend to be *generalist* (balance of features. But these days bias for multimedia services and video performance). **Servers:** are often *specialist* so they are optimised for a task more emphasis for Input and output ie: moving information between hardisk and memory.

- **X86 server cpu**: tend to support cores, threads, cache better than Desktop PC Cpu so x86 is more optimised for *multiple users*. But these are not useful for desktop PC since application are not designed to use the maximise the use of extra core threads and cache

- **Desktop cpu:** Have better average and peak clock rate for one or two operations compared to **server cpu** (number of instructed execute in one cycle). But if more task are performed the desktop cpu have to share with cores so desktop cpu is slower.

- **Video support:** Desktop are optimised for graphic and video work. So video card is placed closed to cpu within architecture so they have access to higher speed busses and transfer instructions to be executed faster but servers operate “headless” video performance is low and support is limited and video card is integrated further away from cpu.

- **PCI:** are found in the motherboard. They allow for addition of modem, network card, sound card, and video card. Desktop PC allow for variety of expansion and capabilities. Provide a few lower performance interface for general purpose + high speed interface for one or more video card. Servers PCI tend to extremes and depends on use of servers (specialised)- server for cpu processing then low PCI or server needed I/o or peripherals then large chassis system with many pci slots

- **Minimising downtime (making sure server is on):** Server will have dual power supply so they are less likely to be any downtime so if one power supply fails they can run on another power supply.

- **Form Factor:** So form is the design. So servers have more designs eg rack based, individual computers, blade server.

- **Interconnecting hardisc technology interface:** Servers tend to allow for more backwards compatibility with different storage types because when you replace server you don't have to buy new things.

- **Different types of storage types for PC**
    - **Sata:** Think hardrives.

- **Different Types of storage types for servers:**
    - **Direct attached Storage:** is digital storage (hard drives but for servers) directly attached to the computer accessing it with cables. There are two types of DAS
        - **Scsi:** Small computer system interconnect that removes some processing on the host computer and performs it on the drive itself (scsi). So if you add more drive it doesn't overload CPU. Disadvantage: connectors are large and thick ribbon cables difficult to physically manage in cramp conditions
            - **Sas (server attached storage):** serial attached Scsi. Are a mixture of SCSI and SATA scheme? Advantages: sas support scsi feature of removing processing from computer cpu to device. Sas can be plugged. Takes less space and more mobile cables then Scsi. More speedy than scsi

    - **Nas (network attached storage):**
        - It is a centralised storage solution.
        - Nas is: a single server or a collection of drives or servers contained in a single device
        - Nas storage connects directly to a network (not to the computer) with an ethernet cable.

    - **SAN:**
        - Is a pool of drivers, devices or servers all connected together using fibre channel or network fabric (not ethernet cable)
        - storage area network where we separate storage component in a server to a dedicated san facility.
        - The server is now cpu + ram + high speed interconnect between san facilities and server via network
        - Used: when we can't fit all drives in an individual server.

    - **Raid:** Allows you to have a group of physical disks provides itself as one logical disk in the system. Where we write redundant info to multiple disc, so data spread across and so if one fails other storage devices will take over.
        - **Raid 0:** *Striping* (bit byte block): Splitting data up across multiple areas (in two different disk). Advantage: Speed because you have two disk doing write/read performances. Disadvantage: If one disk dies then you lost all of data. Since you treat the two disk as one. Used for: performance

        - **Raid 1:** *Mirroring.* Having same exact set of data on two or more disk. EG disk one has data A1 A2 A 3 and disk two has data A1 A2 A3. Advantage: Reliability if one of the disk dies then simply moves over to another working

disk Disadvantage: performance as you only get half the capacity of storage with additional disk. Used for: security

- **Raid 3:** *Striping (bytes) + dedicated parity disk:* they contain parity bits that are rules that can define information on the records. Has min three disk + 1 parity that disk to spin in sync for it to stores. Advantages: disc 1 dies they can reconstructs the disk based of the rules of parity disk (fault tolerance) Disadvantage: random writes every write needs to write to parity disk cos of delay

- **Raid 4:** *Striping (block level) + dedicated parity disk.* Advantages: good random reads cos its stripped Disadvantage: random writes every write needs to write to parity disk so delay

- **Raid 5:** *Striping (block level) + distributed parity (no one parity disc the part disc are cut into small pieces that are distributed to the other 3 disk).* Advantages: No spinning in sync *and* don't lose space cos of dedicated parity disk. But more efficient cos of block level striping. Disadvantage: write needs to write to parity disk

- **Raid 6:** *striping (block) + double distributed parity*. 3 disk + 2 parity disk.

- **Raid 10:** Nested level**-** *Striping + mirror.* Combination of Raid 1 and Raid 0. Disadvantage: space loss. Advantage: adding more drives means that its more security.

- **Which one to use?**
  - DAS: Small business like 7 people. Simple and fast.
  - NAS: Medium sized businesses 70 people. Used for File sharing, remote accesses, and scalability, and portability (since it is cloud).
  - SAN: Large businesses. As large businesses need performance and huge capacity. This is the fastest because of san containing many drivers and the cables connecting to network are fibre channel

Summary: There are four main types of storage: Storage area network (SAN) + Network attached storage (NAS) + Direct attached storage → SCSI or Sas + Sata (for PC)

Reference: https://www.youtube.com/watch?v=bpUzGZLO948

- Desktop PC tend to focus on narrow set of late model storage interfaces ie sata

//ADD LECTURE 4 SERVER HARDWARE AND EXPLAIN. Add/study RAID!!!

Types of servers form:

- **Rack Mount Server:** (stacking servers): *lots of servers* stacked saves space and support scalability. Hardisc normally depends how large rack mount server is:
    - **1RU (1 rack unit):** is short height rack mount for cpu intensive use Used: for lots independent application running.
    - **42RU (42 rack units):** taller height rack mount for storage and file io specifically. Typically for data centre
- **Free standing chassis or towers**: Size of a Desktop computer box. Used for *small numbers of servers* but they take up a lot of space so alternative is rack mount.
- **Blade server:** for clustered of computers that *communicate* strongly with one another. So focuses on networking between devices.

Memory bus: are faster closer to cpu. Slow devices off fast busses because busses wait for other busses.